

U9/7 44852

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SEQUENCE LISTING

<110> FROHBERG, Claus

<120> NUCLEIC ACID MOLECULES ENCODING β -AMYLASE, PLANTS WHICH SYNTHESIZE A
MODIFIED STARCH, GENERATION PROCESSES AND USES

<130> 514413-3864

<150> PCT/EP99/05523

<151> 1999-07-30

<150> 198 36 099.1

<151> 1998-07-31

<160> 2

<170> PatentIn version 3.0

<210> 1

<211> 1950

<212> DNA

<213> Solanum tuberosum

<220>

<221> CDS

<222> (16)..(1752)

<223> coding sequence beta-amylase

<400> 1

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| attaatatta ttatt atg gca atg agt ctg cca cac cag atc ggt gcc tta | 51 |
| Met Ala Met Ser Leu Pro His Gln Ile Gly Ala Leu | |
| 1 5 10 | |

| | |
|---|----|
| tca gga aca tcg ctc acg gcg gaa acc ggt gga gtt tca tgc gaa gtt | 99 |
| Ser Gly Thr Ser Leu Thr Ala Glu Thr Gly Gly Val Ser Cys Glu Val | |
| 15 20 25 | |

| | |
|---|-----|
| ccg gcg aag ggg agt tca gct aca tca gct atg tgg aga aca ccg atg | 147 |
| Pro Ala Lys Gly Ser Ser Ala Thr Ser Ala Met Trp Arg Thr Pro Met | |
| 30 35 40 | |

| | |
|---|-----|
| acg aat tta aaa gta tcg gta caa aaa aca gga act gaa att gac agg | 195 |
| Thr Asn Leu Lys Val Ser Val Gln Lys Thr Gly Thr Glu Ile Asp Arg | |
| 45 50 55 60 | |

| | |
|---|-----|
| gtg tcg ccg tcg ccg tcg ccg ccg atg agt ccg atg atg gga gga gga | 243 |
| Val Ser Pro Ser Pro Ser Pro Pro Met Ser Pro Met Met Gly Gly Gly | |
| 65 70 75 | |

| | |
|---|-----|
| atg cgg ccg gat tta tta gcg tgt caa gcg ttg atg gaa gct cag gta | 291 |
| Met Arg Pro Asp Leu Leu Ala Cys Gln Ala Leu Met Glu Ala Gln Val | |
| 80 85 90 | |

| | |
|---|-----|
| gat gag gta gtt gag aga gaa tat aag gtt agg aat tcg tcg gag aaa | 339 |
| Asp Glu Val Val Glu Arg Glu Tyr Lys Val Arg Asn Ser Ser Glu Lys | |

F04E50-2534260

| 95 | 100 | 105 | |
|---|-----|-----|------|
| gag aaa gga gtt ccg gtg ttt gtt atg atg ccg ttg gat agt gtg aaa Glu Lys Gly Val Pro Val Phe Val Met Met Pro Leu Asp Ser Val Lys 110 115 120 | | | 387 |
| atg gat cat act gtg aat agg aag aag gcg atg aat gcg agt tta cag Met Asp His Thr Val Asn Arg Lys Lys Ala Met Asn Ala Ser Leu Gln 125 130 135 140 | | | 435 |
| gcg ttg aag agc gcc ggt gtg gaa ggg att atg atg gat gtg tgg tgg Ala Leu Lys Ser Ala Gly Val Glu Gly Ile Met Met Asp Val Trp Trp 145 150 155 | | | 483 |
| gga ttg gtg gag aga gat gcg ccg gga gag tat aat tgg ggc ggt tat Gly Leu Val Glu Arg Asp Ala Pro Gly Glu Tyr Asn Trp Gly Gly Tyr 160 165 170 | | | 531 |
| gct gag ctt atg gaa atg gcg aaa aaa cat gga ctc aaa gtt caa gct Ala Glu Leu Met Glu Met Ala Lys Lys His Gly Leu Lys Val Gln Ala 175 180 185 | | | 579 |
| gtg atg tct ttc cat caa tgt ggt gga aac gtc ggt gat tcc tgc acg Val Met Ser Phe His Gln Cys Gly Gly Asn Val Gly Asp Ser Cys Thr 190 195 200 | | | 627 |
| atc cct ctt cca agg tgg gtt gtt gag gag atg gag aag gat cca gat Ile Pro Leu Pro Arg Trp Val Val Glu Glu Met Glu Lys Asp Pro Asp 205 210 215 220 | | | 675 |
| ctt gca tac aca gat cag tgg gga agg agg aat ttt gaa tat gta tcg Leu Ala Tyr Thr Asp Gln Trp Gly Arg Arg Asn Phe Glu Tyr Val Ser 225 230 235 | | | 723 |
| ctt ggt tgc gat aca ctt cca gtt ctt aaa gga agg act cct gtc caa Leu Gly Cys Asp Thr Leu Pro Val Leu Lys Gly Arg Thr Pro Val Gln 240 245 250 | | | 771 |
| tgc tat tct gat ttc atg aga ggg ttt aga gat aga ttt gag aat ctc Cys Tyr Ser Asp Phe Met Arg Gly Phe Arg Asp Arg Phe Glu Asn Leu 255 260 265 | | | 819 |
| cta ggt gac acc att gtg gaa att caa gtc ggg atg ggt cca gct gga Leu Gly Asp Thr Ile Val Glu Ile Gln Val Gly Met Gly Pro Ala Gly 270 275 280 | | | 867 |
| gag ctc cgt tat cca tcc tat ccg gaa aaa gat gga gta tgg aaa ttc Glu Leu Arg Tyr Pro Ser Tyr Pro Glu Lys Asp Gly Val Trp Lys Phe 285 290 295 300 | | | 915 |
| cct gga att ggt gct ttt cag tgt tat gac aag tac atg atc agt agc Pro Gly Ile Gly Ala Phe Gln Cys Tyr Asp Lys Tyr Met Ile Ser Ser 305 310 315 | | | 963 |
| tta cag ggt gca gca gaa gct ttt ggt aag cct gaa tgg gga cac acc Leu Gln Gly Ala Ala Glu Ala Phe Gly Lys Pro Glu Trp Gly His Thr 320 325 330 | | | 1011 |

| | |
|---|------|
| ggt cca acc gat gct ggt cag tac aac aat tgg cca gaa gat acc aac Gly Pro Thr Asp Ala Gly Gln Tyr Asn Asn Trp Pro Glu Asp Thr Asn 335 340 345 | 1059 |
| ttt ttc aag aag gaa ggt ggt gga tgg gat agt caa tat ggg gag ttc Phe Phe Lys Lys Glu Gly Gly Gly Trp Asp Ser Gln Tyr Gly Glu Phe 350 355 360 | 1107 |
| ttc ctc act tgg tat tct gag atg ctt ttg aac cat ggt gag agg ata Phe Leu Thr Trp Tyr Ser Glu Met Leu Leu Asn His Gly Glu Arg Ile 365 370 375 380 | 1155 |
| ctg caa tca gcc aag gcg ata ttc gag gac aag ggt gtt aag att tca Leu Gln Ser Ala Lys Ala Ile Phe Glu Asp Lys Gly Val Lys Ile Ser 385 390 395 | 1203 |
| gtt aag att gca ggt att cac tgg cac tat gga aca agg tcc cat gcc Val Lys Ile Ala Gly Ile His Trp His Tyr Gly Thr Arg Ser His Ala 400 405 410 | 1251 |
| cct gag ctg acc gct gga tac tac aac acc cgt aac cga gat ggt tac Pro Glu Leu Thr Ala Gly Tyr Tyr Asn Thr Arg Asn Arg Asp Gly Tyr 415 420 425 | 1299 |
| ctt ccc atc gcc caa atg ctt gcc cgc cac ggt gca gtt ttc aac ttc Leu Pro Ile Ala Gln Met Leu Ala Arg His Gly Ala Val Phe Asn Phe 430 435 440 | 1347 |
| aca tgt gtt gag atg cgt gac cac gag cag cca caa gat gca cta tgt Thr Cys Val Glu Met Arg Asp His Glu Gln Pro Gln Asp Ala Leu Cys 445 450 455 460 | 1395 |
| gca cct gag aag ttg gtt agg caa gtg gct tta gca act cag gaa gct Ala Pro Glu Lys Leu Val Arg Gln Val Ala Leu Ala Thr Gln Glu Ala 465 470 475 | 1443 |
| caa gtt cca ctt gct ggg gag aat gca ttg cca cga tac gat gat tat Gln Val Pro Leu Ala Gly Glu Asn Ala Leu Pro Arg Tyr Asp Asp Tyr 480 485 490 | 1491 |
| gca cat gaa cag atc ctt caa gca tcc tca ttg aat atc aac gat caa Ala His Glu Gln Ile Leu Gln Ala Ser Ser Leu Asn Ile Asn Asp Gln 495 500 505 | 1539 |
| tca ggt gat aga gag atg tgc gcg ttt aca tat ttg agg atg aat cct Ser Gly Asp Arg Glu Met Cys Ala Phe Thr Tyr Leu Arg Met Asn Pro 510 515 520 | 1587 |
| gac cta ttc cat cct gat aac tgg agg cga ttc gtt gcc ttc gtg aag Asp Leu Phe His Pro Asp Asn Trp Arg Arg Phe Val Ala Phe Val Lys 525 530 535 540 | 1635 |
| aaa atg aaa gaa gga aaa gac gca aac aaa tgc cgg gaa caa gta gag Lys Met Lys Glu Gly Lys Asp Ala Asn Lys Cys Arg Glu Gln Val Glu 545 550 555 | 1683 |

agg gag gca gag cat ttc gtg cat ata act cag ccg tta gtg caa gaa 1731
 Arg Glu Ala Glu His Phe Val His Ile Thr Gln Pro Leu Val Gln Glu
 560 565 570

gct gca gct gcc ctc atg cac taagcaaag gttgtcaaag agtactgtaa 1782
 Ala Ala Ala Ala Leu Met His
 575

ttttgatcct ttttagctaac atggagtttt tcaacatggt acgaggatct tatagctcgt 1842

tatcgttcctt cttatatggt tgtaaaactg tccatcggtgt attttttcga agttagacat 1902

tatgtcttaa tgaaatgata cataattcag tagtaaaaaa aaaaaaaaa 1950

<210> 2
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 <213> Solanum tuberosum

<400> 2

Met Ala Met Ser Leu Pro His Gln Ile Gly Ala Leu Ser Gly Thr Ser
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Leu Thr Ala Glu Thr Gly Gly Val Ser Cys Glu Val Pro Ala Lys Gly
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Ser Ser Ala Thr Ser Ala Met Trp Arg Thr Pro Met Thr Asn Leu Lys
 35 40 45

Val Ser Val Gln Lys Thr Gly Thr Glu Ile Asp Arg Val Ser Pro Ser
 50 55 60

Pro Ser Pro Pro Met Ser Pro Met Met Gly Gly Gly Met Arg Pro Asp
 65 70 75 80

Leu Leu Ala Cys Gln Ala Leu Met Glu Ala Gln Val Asp Glu Val Val
 85 90 95

Glu Arg Glu Tyr Lys Val Arg Asn Ser Ser Glu Lys Glu Lys Gly Val
 100 105 110

Pro Val Phe Val Met Met Pro Leu Asp Ser Val Lys Met Asp His Thr
 115 120 125

Val Asn Arg Lys Lys Ala Met Asn Ala Ser Leu Gln Ala Leu Lys Ser
 130 135 140

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Ala Gly Val Glu Gly Ile Met Met Asp Val Trp Trp Gly Leu Val Glu
145 150 155 160

Arg Asp Ala Pro Gly Glu Tyr Asn Trp Gly Gly Tyr Ala Glu Leu Met
165 170 175

Glu Met Ala Lys Lys His Gly Leu Lys Val Gln Ala Val Met Ser Phe
180 185 190

His Gln Cys Gly Gly Asn Val Gly Asp Ser Cys Thr Ile Pro Leu Pro
195 200 205

Arg Trp Val Val Glu Glu Met Glu Lys Asp Pro Asp Leu Ala Tyr Thr
210 215 220

Asp Gln Trp Gly Arg Arg Asn Phe Glu Tyr Val Ser Leu Gly Cys Asp
225 230 235 240

Thr Leu Pro Val Leu Lys Gly Arg Thr Pro Val Gln Cys Tyr Ser Asp
245 250 255

Phe Met Arg Gly Phe Arg Asp Arg Phe Glu Asn Leu Leu Gly Asp Thr
260 265 270

Ile Val Glu Ile Gln Val Gly Met Gly Pro Ala Gly Glu Leu Arg Tyr
275 280 285

Pro Ser Tyr Pro Glu Lys Asp Gly Val Trp Lys Phe Pro Gly Ile Gly
290 295 300

Ala Phe Gln Cys Tyr Asp Lys Tyr Met Ile Ser Ser Leu Gln Gly Ala
305 310 315 320

Ala Glu Ala Phe Gly Lys Pro Glu Trp Gly His Thr Gly Pro Thr Asp
325 330 335

Ala Gly Gln Tyr Asn Asn Trp Pro Glu Asp Thr Asn Phe Phe Lys Lys
340 345 350

Glu Gly Gly Gly Trp Asp Ser Gln Tyr Gly Glu Phe Phe Leu Thr Trp
355 360 365

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